Highway 1 Chip Seal Partnership Resolves Friction

When Caltrans repaired a section of State Route 1 in San Luis Obispo County in late 2012, we had no idea the repaired highway would cause friction, in more ways than one, with several bicycle advocacy groups that ride along the Pacific coastline. This "rough road," however, led to a new partnership and turned out to be an opportunity to improve our practices so we can better serve all users of the roadway.

In fall 2012, Caltrans placed a modified binder chip seal on Highway 1 in San Luis Obispo County, a two-lane highway extending along the Pacific coastline from the town of Cambria to the Monterey County line. A chip seal, also referred to as a seal coat, is a preventive maintenance strategy in which a layer of bonded aggregate—essentially small pieces of gravel—are affixed to the top of an existing asphalt road. This resurfacing technique can save taxpayers considerable money by postponing the need to replace an aging road. Chip seal provides a wear surface that protects the underlying pavement from deterioration, in much the same way that painting a house protects the siding. Caltrans anticipated the chip seal would provide another five to 10 years of wear surface for this portion of Highway 1 and would greatly reduce maintenance needs over that time. From Caltrans' perspective, this project was a success: a smoother road and a protected road surface that would need less upkeep.

Smooth for Drivers, but not for Cyclists

The chip seal, while effective for vehicle use, resulted in an extremely rough ride for cyclists. This was of particular concern because this section of highway is one of the most cycled roads in North America. Bicyclists come to the Pacific Coast to enjoy the scenery and pedal the 1,852 miles along the beautiful coastline from Canada down to Imperial Beach, California.

A grassroots effort by the cycling community demanded a fix and grew to include county supervisors, state officials, and national cycling groups. Their proposal was to have the 23-mile stretch of roadway repaved with conventional asphalt concrete pavement, but with a price tag exceeding $7 million, the funds were not available within the existing maintenance budget. Furthermore, even if we tried to make improvements, current Caltrans chip seal specifications do not have a quantifiable indicator to effectively evaluate any improvement to the road's roughness. In March 2013, we used heavy rollers to smooth out the surface, but that resulted in minimal improvement.

Unique Partnership Finds Solution

Caltrans agreed to work with the bicycle community and researchers to find a way to evaluate and potentially resolve the roughness issue on Highway 1. We partnered with the University of California Pavement Research Center at UC Davis to conduct a two-phase study. The first phase evaluated different pavement surfaces using both specialized equipment and individual bicycle riders' perceptions. The second phase looked internally at our practices and specifications and proposed improvements we could make that would benefit both cyclists and roadway maintenance.

We evaluated different applications around San Luis Obispo County roadways and then applied five different remedial pavement treatments to test sections on Highway 198 in Monterey County. Local cyclists volunteered to ride each test section and complete an evaluation sheet prepared by the Pavement Research Center. The cyclist test complemented tests being done with specialized equipment, including a laser texture scanner and inertial profiler, which measure pavement ride quality.

Bicyclists gave several of the test treatment segments the thumbs up as acceptable surface improvements. Ultimately, the sand seal application was chosen—a sprayed application of asphalt emulsion followed by a cover of clean sand. Not only did the new surface create a less bumpy ride for bicyclists, it was done at a cost of $1.5 million—much less than the $7 million it would have cost to repave the highway.

Smooth Ride Brings Happy Ending

Caltrans finished the sand seal in 2013, and shortly after, the local bicycle community sent a letter of thanks expressing their appreciation for Caltrans' willingness to listen to cyclists concerns and to evaluate and fix the problem. Since the project's completion, several large organized bike rides, including the Amgen Tour of California, have traveled this section of Highway 1 without concerns.

Through our unique partnership, Caltrans was able to respond to bicyclists' concerns and effectively and economically provide a pavement surface that met the needs of everyone who uses this stretch of scenic highway. Caltrans and the University of California Pavement Research Center will perform a long-term study to evaluate our current chip seal specifications. Potential improvements may add smoothing techniques and modify the asphalt binder layer and rock sizes along bicycle routes. Our objective is a long-term Caltrans policy to improve the bicycling experience while maintaining the benefits of the chip seal strategy. We will continue community outreach to find a timely and cost-effective solution that meets the shared needs of California's taxpayers, motorists, and cyclists.

The Pavement Research Center's final report, "*Surface Treatment Macrotexture and Bicycle Ride Quality*" is available at http://www.its.ucdavis.edu/research/publications/publication-detail/?pub_id=2121.

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Fiscal year	Maintenance Contract Dollars Awarded	Pavement Maintenance Contracts Awarded	Maintenance Contract Dollars Spent on Chip Seals
2010–11	$332 million	3,231	$24 million
2011–12	$274 million	2,449	$14 million
2012–13	$202 million	2,051	$14 million

Chip seals are a preventive maintenance strategy to keep good pavement in good condition. Caltrans usually uses chip seals on rural, two-lane roads with less than 30,000 vehicles a day. Depending on the environment, traffic, and number of semitrucks, the chip seal can last between five and 10 years. At $55,000 per lane mile, the cost of using chip seal is low, versus about $842,000 per lane mile for a rehabilitation project.